



**MARK G. STRAUSS, PH.D.**

***PH.D. IN BIOMEDICAL ENGINEERING***  
***B.S. in Mechanical Engineering***

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## **CURRENT EMPLOYMENT**

**Ruhl Forensic, Inc.**, since 1993.

Areas of consultation include industrial, vehicular and construction forensic investigation, especially involving biomechanics, human factors, injury causation, product safety, instrumentation and measurement. Current research includes development of an air brake analyzer, profiling air brake failures, and cargo movement during shipment.

**University of Illinois at Urbana-Champaign**, since August 1987.

Adjunct Associate Professor, Department of General Engineering. Content of courses taught includes engineering graphics/computer automated design, finite element analysis, mechanisms, engineering design, electronics, structural testing techniques, data acquisition, experimental procedures, biomechanics, ergonomics, rehabilitation engineering, anatomy, physiology, reflexes, and adaptive technology.

## **PREVIOUS APPOINTMENTS**

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| 4/94-1/98  | Project Director of a National Science Foundation sponsored program to research the causes of under-representation of persons with disabilities in science, engineering and mathematics careers.   |
| 6/92-8/95  | Project Director of RSA sponsored program on long term training of graduate level rehabilitation engineers.  |
| 6/88-6/94  | Project Director of National Science Foundation sponsored program to improve the problem solving and design skills of engineering undergraduates.  |
| 3/91-12/91 | Steering Committee Chairman of the Illinois Assistive Technology Project.  |
| 8/90-12/91 | Member of Advisory Council and Committee on Assistive Technology Training for the Illinois Assistive Technology Project, PL 100-407.   |
| 1/89-5/93  | Impartial Hearing Officer, Illinois Department of Rehabilitation Services.   |
| 9/88-9/90  | Visiting Research Associate, Hines V.A. Medical Center, Rehabilitation Research and Development, Hines, Illinois.  |
| 6/83-8/87  | Engineering supervisor of the research program "Non-invasive Quantification of Fracture Healing," Veterans Administration Medical Center, Dallas, Texas. Researched the development of a technique to non-invasively assess the functional state of a fractured bone. Designed and performed human, animal |

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and finite element studies to evaluate the breaking strength of bone.

9/79-7/81      Rehabilitation Engineering Fellow, Rehabilitation Engineering Center, Charlottesville, Virginia. Clinical observations and assessments, designing and fabricating devices for persons with acute and chronic injuries, and disabilities. The design of an acrylic cervical orthosis which would provide for an unobstructed x-ray view of the cervical spine culminated in a patent application.

**EDUCATION**

Ph.D., 1988:	University of Texas at Arlington and University of Texas Health Science Center at Dallas
Major Field:	Biomedical Engineering
M.E., 1981:	University of Virginia, Charlottesville, Virginia
Major Field:	Biomedical Engineering
Graduate, 1981:	Rehabilitation Engineering Center, Charlottesville, Virginia
Major Field:	Rehabilitation Engineering
B.S., 1979:	Polytechnic Institute of New York, Brooklyn, New York
Major Field:	Mechanical Engineering

**HONORS AND AWARDS**

2002	Research publication SAE 2002-01-3104 judged by peers to be among the most outstanding technical research published in the field in 2002
2001	Research publication SAE 2001-01-2755 judged by peers to be among the most outstanding technical research published in the field in 2001
2000	Faculty advisor to students who were awarded The National Lincoln Arc Welding Merit Award for Design
1997	Faculty advisor to students who were awarded The National Lincoln Arc Welding Merit Award for Design
1996	Faculty advisor to students who won 3 <sup>rd</sup> place award at the University of Illinois Engineering Open House for graduate research
1995	Faculty advisor to students who won 3 <sup>rd</sup> place award at the University of Illinois Engineering Open House for graduate research
1995	"Outstanding Student Advisor," awarded by the Dean's Student Advisory Committee
1994	"Outstanding Student Advisor," awarded by the Dean's Student Advisory Committee
1993	Faculty advisor to students who won 1 <sup>st</sup> place award at the University of Illinois Engineering Open House for interdisciplinary research
1993	Faculty advisor to graduate student group who won 1 <sup>st</sup> place award for research in General Engineering
1993	Faculty advisor to student who won 3 <sup>rd</sup> place award at the University of Illinois Engineering Open House for undergraduate research
1992	Faculty advisor to student who was awarded The National Lincoln Arc Welding Silver Award for Design
1992	Faculty advisor to 2 <sup>nd</sup> and 4 <sup>th</sup> place student awards at the University of Illinois Engineering Open House

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1991	Faculty advisor to student group awarded The Larson Award for Engineering Design
1991	Nominated for the Everitt Award for Teaching Excellence
1991	Faculty advisor to 1 <sup>st</sup> place award for Interdisciplinary Research at the University of Illinois Engineering Open House
1990	Faculty advisor to student group receiving award from the National Lincoln Arc Welding design competition.
1990	United Way award for Community Service, "Using Engineering to Alleviate Problems of the Disabled."
1990	"Outstanding Student Advisor," awarded by the Dean's Student Advisory Committee
1990	Faculty advisor to 3 <sup>rd</sup> place award for Original Undergraduate Research at University of Illinois Engineering Open House
1989	Faculty advisor to 4 <sup>th</sup> place award for Central Exhibit at University of Illinois Engineering Open House
1988	Faculty advisor to 3 <sup>rd</sup> place award for Original Undergraduate Research at University of Illinois Engineering Open House
1988	Nominated Outstanding Alumnus of the University of Texas at Arlington Biomedical Engineering Program
1985	Outstanding Biomedical Engineering Student Award
1982-1984	Elected Vice President Biomedical Engineering Society Student Chapter
1983	First Place, Engineering School Laboratory Presentation
1979-1981	RSA, Rehabilitation Engineering Fellowship

**PROFESSIONAL ASSOCIATIONS**

American College of Forensic Examiners, Diplomate  
 American Society of Biomechanics (ASB)  
 Association for the Advancement of Automotive Medicine (AAAM)  
 Engineering in Medicine and Biology Society (EMBS)  
 Engineering Society for Advancing Mobility- Land, Sea, Air and Space (SAE)  
 Human Factors and Ergonomics Society (HFES)  
 The Institute of Electrical and Electronic Engineers (IEEE)  
 National Association of Professional Accident Reconstruction Specialists (NAPARS)  
 National Safety Council (Organization membership) (NSC)

**PROFESSIONAL ACTIVITIES**

Aug. 2002-Present	SAE Transaction Selection Committee for: Accident Reconstruction, Human Factors, and Braking and Steering Systems
1996 - Present	Member of ANSI/HFES 300 standards committee

**PEER REVIEWER FOR THE FOLLOWING JOURNALS AND ORGANIZATIONS**

Assistive Technology Journal  
 Engineering in Medicine and Biology  
 Human Factors and Ergonomic Society  
 The Institute of Electrical and Electronic Engineers, Transactions on Biomedical Engineering

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Journal on Tactile Displays  
 National Science Foundation, Division of Emerging Engineering Technologies, SBIR  
 U.S. National Science Foundation, Directorate for Education and Human Resources  
 U.S. National Science Foundation, Directorate for Engineering, Combined Research-Curriculum Development Program  
 U.S. Department of Education, Rehabilitation Services Administration Spinal Cord Research Foundation  
 University of Illinois at Urbana-Champaign, Research Board

## **ADDITIONAL TRAINING AND EDUCATION**

2003 Certified Vetronix Crash Data Retrieval system operator  
 2003 Illinois Association of Technical Accident Investigators, Mount Vernon, IL  
 2001 CDL Defensive Driving Class, Champaign, IL  
 2001 OSHA 10-Hour Construction Safety and Health Course, Champaign, IL  
 2001 Using a pulsed laser total station and data recorder to perform forensic mapping of an accident scene, TOPCON, Champaign, IL  
 2001 OSHA Machinery and Machine Guarding, Dallas, TX  
 2000 American Association of Automotive Medicine Conference, Chicago, IL  
 2000 Human Factors and Ergonomics Society meeting, San Diego, CA  
 2000 Human Factors Approach to Accident Analysis and Prevention, San Diego, CA  
 2000 A Guide to Methodology in Ergonomics, San Diego, CA  
 2000 Biomechanics of Impact, American Association of Automotive Medicine, Indianapolis, IN  
 1999 Heavy Vehicle Reconstruction, Northwestern University Traffic Institute, Evanston, IL  
 1999 Human Factors and Ergonomic Society Conference, Houston, TX  
 1999 43<sup>rd</sup> Stapp Car Crash Conference, San Diego, CA  
 1999 27<sup>th</sup> Annual International Workshop on Human Subjects for Biomechanical Research, San Diego, CA.  
 1999 3<sup>rd</sup> Annual Crash Injury Research and Engineering Network Symposium, San Diego, CA  
 1998 Advanced Truck Air Brake Systems, Haldex/Midland, Kansas City, MO  
 1997 Advanced Ergonomics Application Workshop, Univ. Of Wisconsin-Madison, Madison, WI  
 1996 Human Factors and Ergonomics Society Conference, Philadelphia, PA  
 1996 Truck system operations, Prairie International, Champaign, IL  
 1996 Orthopaedic Research Society meeting, Atlanta, GA  
 1995 Traffic Accident Reconstruction, Northwestern University Traffic Institute, Evanston, IL  
 1995 39<sup>th</sup> Stapp Car Crash Conference, San Diego, CA  
 1995 Accidental Injury: Biomechanics and Prevention, University of California, San Diego, School of Medicine, San Diego, CA  
 1990 Biomechanics of Human Motion, Massachusetts Institute of Technology, Boston, MA

## **PARTIAL LISTING OF CONFERENCE PRESENTATIONS**

Strauss, M.G., Carnahan, J.V., and Inendino, L.V., Jayswal, R., Senalik, C.A., Southcombe, E.J., "Factors affecting the friction coefficients between wooden and plastic pallets and the wooden floor of a van-type semi-trailer." SAE International Truck and Bus and Meeting and Exposition, Detroit, MI, November, 2002.

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Strauss, M.G., "Biomechanics of a Low Speed Rear-End Collision," presented at the 11<sup>th</sup> Congress of the European Association for Research and Analysis of Road Accidents, Portoroz, Slovenia, September 6-7, 2002.

Ruhl, Roland L., Fittanto, Dan A., and Strauss, Mark G., "Full Scale Testing of Class 8 Tractor/Livestock Trailer," presented at the European Conference for Accident Reconstruction, Neumuenster, Germany, May 31 – June 1, 2002.

Strauss, M.G., Carnahan, J.V., and L.V. Inendino, "Factors Affecting the Friction Coefficients Between Wooden Pallets and the Wooden Floor of a Van-type Semi-trailer." SAE International Truck and Bus Meeting and Exposition, Chicago, IL, November 13, 2001.

Strauss, M.G., "Measurement of the dynamic forces during manual wheelchair propulsion." American Society of Biomechanics, Tempe, AZ, October 16, 1991.

Strauss, M.G., Moeinzadeh, M.H., Schneller, M., and Trimble, J. "The development of an instrumented wheel to determine the handrim forces during wheelchair propulsion." San Francisco, CA, December, 1989.

Struass, M.G., "Non-invasive assessment of fracture healing using impace resonant frequency analysis—An in-vitro FEM model and in-vivo correlations." 15<sup>th</sup> Annual Bioengineering Conference, Boston, MA, March 28, 1989.

Strauss, M.G., Bucholz, R.W., Tencer, A.F., and Lawrence, K.L. "Quantifying fracture healing in the human and in the dog." 8<sup>th</sup> Annual Engineering in Medicine and Biology Conference. Fort Worth, TX, November 8-10, 1986.

Strauss, M.G., Bucholz, R.W., Tencer, A.F., and Lawrence, K.L. "Resonance frequency evaluation of patients with closed tibia fractures." 3<sup>rd</sup> Southern Biomedical Engineering Conference, Birmingham, AL, October 15-16, 1984.

Strauss, M.G., Bucholz, R.W., Tencer, A.F., and Lawrence, K.L. "Clinical fracture healing assessment by mechanical resonance." The 37<sup>th</sup> Annual Conference on Engineering in Medicine and Biology, Los Angeles, CA, September 17-19, 1984.

Strauss, M.G. Bucholz, R.W. Tencer, A.F., and Lawrence, K.L. "Identification of variables in the measurement of the resonant frequencies of human tibiae *in vivo*." 2<sup>nd</sup> Southern Biomedical Engineering Conference, San Antonio, TX, 1983.

Strauss, M.G., and O'Reagan, J. "An X-ray translucent cervical orthosis". First Southern Biomedical Engineering Conference, 1982.

**PARTIAL LISTING OF INVITED PRESENTATIONS**

"Demonstrative and Illustrative Evidence." Illinois College of Advocacy, Champaign, IL, July 18, 2003.

"Vehicle Collisions and Reconstruction," Indiana Trial Lawyers' Association, Indianapolis, IN, November 2002.

"Trucks and Injuries." Great West Casualty, Bloomington, IN, August 5, 1998.

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"The Use of Technology in Accident Investigation and Biomechanics." Litigation in the 21<sup>st</sup> Century – State Bar of Montana Continuing Legal Education Institute, Butte, MT, March 13, 1998.

"Biomechanics of Injury," Hartford Midwest Regional Seminar, Chicago, IL, November 1997.

"Engineering and Disabilities," Strauss, M., Caldwell, J and S Weaver, American Society of Engineering Educators, Washington, D.C., June 25, 1996.

"Adapting the Job for the Employee with a Disability," Conference of Clinical Applications for Return to Work." Urbana, Illinois, May 6, 1994.

"Relative Performance of Aluminum and Galvanized Steel Evaporators," Stencil, M. and M.G. Strauss, 14<sup>th</sup> Annual Conference of the International Institute of Ammonia Refrigeration, Miami, Florida, March 23, 1992.

"Life After Neurologic Accidents and Disease – Living, Not Just Existing," Neurologic Rehabilitation of Stroke Patients, continuing education course for the American Academy of Neurology. Southern Illinois University School of Medicine, Springfield, Illinois, October 14, 1991.

"Making Reasonable Accommodation Through Specialized Equipment and Procedural Change," The National Industry Labor Council, St. Louis, Missouri, October 4, 1990.

"Synthetic Navigation for the Blind Traveler," The International Society for Ecological Psychology XVII, University of Illinois, Champaign, Illinois, May 22, 1990.

"Disabilities in the Workplace – An Engineering Solution," Illinois Affirmative Action Officers Association, 16<sup>th</sup> Annual Conference, Normal, Illinois, December 1, 1989.

"Using Technology to Assist the Disabled Worker – An Engineer's Perspective," Quad Cities Merit Employment Council, Moline, Illinois, October 25, 1989.

"How Technology Can Play an Important Role in the Rehabilitation of Stroke Victims," Southern Illinois University School of Medicine, October 17, 1989.

"Enhancing Abilities Through Technology and Research," National Rehabilitation Association, Rock Island, Illinois, May 9, 1989.

"Using Non-invasive Methods to Assess the Strength of Healing Fractures," DePuy Orthopedics, Warsaw, Indiana, March 23, 1989.

"Non-invasive Quantification of Fracture Healing," Southwestern Medical School Orthopedic, Grand Rounds, Dallas, Texas, 1984.

## **PUBLICATIONS**

Inendino, L.V., Strauss, M.G., Medanic, J.V. "Development of a dynamic model of an air-ride seat for on-highway trucks". SAE Paper 2003-01-3363, Fort Worth, TX, 2003.



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Strauss, M.G., Carnahan, J.V., and Inendino, L.V., Jayswal, R., Senalik, C.A., Southcombe, E.J., "Factors affecting the friction coefficients between wooden and plastic pallets and the wooden floor of a van-type semi-trailer." SAE Paper 2002-01-3104, Detroit, MI, 2002. Also published in SAE 2002 Transactions – Journal of Commercial Vehicles.

Ruhl, Roland L., Dan A. Fittanto and Mark G. Strauss, "Full scale testing of Class 8 Tractor/Livestock Trailer," Proceedings of the European Conference for Accident Reconstruction, Neumuenster, Germany, May 31-June 1, 2002.

Strauss, M.G., "Biomechanics of a Low-Speed Rear-end Collision," Lecture notes in Road Vehicle Accident Reconstruction, edited by Ivan Prebil and Iztok Cigaric, Littera Picta, Ljubljana, Slovenia, 2002.

Strauss, M.G., Carnahan, J.V. and L. V. Inendino, "Factors affecting the friction coefficients between wooden pallets and the wooden floor of a van-type semi trailer." SAE Paper 2001-01-2755, Chicago, IL, 2001. Also published in SAE 2001 Transactions – Journal of Commercial Vehicles.

Fittanto, Dan A., Ruhl, Roland L., and Mark G. Strauss, "Dynamics and roll stability of a loaded Class 8 tractor and livestock semi-trailer: an EDVDS Application," WP#2000-4, 2000 HVE Forum, San Diego, CA, May 8-12, 2000.

Editorial duties on *Truck and Trucking Handbook: A Primer*, published by Ruhl and Associates - Forensic, Inc., May, 2000.

Clark, B.A., Ruhl, R.L., Strauss, M.G., Mahal, T., and Fittanto, D.A., "Dynamics and Roll Stability of a Loaded Class 8 Tractor-Livestock Semi-Trailer," SAE Paper 1999-01-3732, 1999 SAE International Truck and Bus Meeting and Exposition, Detroit, MI, November 15-17, 1999. (Also published in Roll Stability Dynamics, Ride and Handling, SP-1486.)

Alston, R. J., Hampton, J. L., Bell, T. J., and Strauss, M.G. "Matriculation of persons with disabilities in science and engineering: Perceptions of rehabilitation counselors." Journal of Applied Rehabilitation Counseling. Vol 29(3), Fall 1998, 5-8.

Strauss, M. G., Caldwell, J. and Weaver, S. "Engineering and disabilities." American Society of Engineering Educators Annual Conference, Washington, D.C., Proceedings, 1996.

Strauss, M. G. and Brusnighan, D. "Independent navigation by people who are blind". Brazilian Journal of Adapted Physical Education Research, pp. 169-181, 1(1), 1994.

Stencil, M. and Strauss, M.G. "Relative performance of aluminum and galvanized steel evaporators." 14<sup>th</sup> Annual Conference of the International Institute of Ammonia Refrigeration, Miami, Proceedings, 1992.

Strauss, M. G., Maloney, J., Ngo, F., and Phillips, M. (1991) "Measurement of the dynamic forces during manual wheelchair propulsion." American Society of Biomechanics, Proceedings, Tempe, Arizona, pp. 210-211, 1991.

Strauss, M. G. "Empowering rehabilitation counselors with Technology: A course description". Rehabilitation Education, pp. 319-324, 5(4), 1991.

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Moeinzadeh, M. H., Schneller, M. A., Strauss, M. G., and Trimble, J. "Three dimensional biomechanical analysis of the upper extremity during wheelchair propulsion." First World Congress of Biomechanics, Proceedings, San Diego, California, p. 26, 1990.

Strauss, M. G., Moeinzadeh, M. H., Schneller, M., and Thimble, J. "The development of an instrumented wheel to determine the handrim forces during wheelchair propulsion." ASME Winter Annual Meeting, San Francisco, 1989 Advances in Bioengineering, pp. 53-54, 1989.

Strauss, M. G. and Moeinzadeh, M. H. "Rehabilitation Engineering at the University of Illinois." 1989 American Society of Engineering Educators Annual Conference, Lincoln, Nebraska, Proceedings, pp. 196-198, 1989.

Brusnighan, D. A., Strauss, M. G., Floyd, J. M., and Wheeler, B. C. "Orientation aid implementing the global positioning system." 15<sup>th</sup> Annual Bioengineering Conference, Boston, Proceedings, pp. 33-34, 1989.

Strauss, M. G. "Non-invasive assessment of fracture healing using impact resonant frequency analysis -- An *in vitro* FEM model and in vivo correlations." 15<sup>th</sup> Annual Bioengineering Conference, Boston, Proceedings, pp. 215-216, 1989.

Jones, R. E., Strauss, M. G., Bucholz, R. W., and Lawrence, K. L. "Non-invasive assessment of fracture healing." Rehabilitation R & D Progress Reports. Vol. 25, No. 1, pp. 286-287, 1987.

Strauss, M. G., Bucholz, R. W., and Lawrence, K. L. "Quantifying fracture healing in the human and in the dog." 8<sup>th</sup> Annual Engineering in Medicine and Biology Society Conference. Fort Worth, Proceedings, pp. 1551-1554, 1986.

Jones, R. E., Strauss, M. G., Bucholz, R. W., and Lawrence, K. L. "Quantifying fracture healing by impulse transfer functions." Rehabilitation R & D Progress Reports, Vol. 24, pp. 232-233, 1986.

Strauss, M. G. "Non-invasive quantification of fracture healing." Rehabilitation R & D Progress Reports, p. 226, 1985.

Strauss, M. G., Bucholz, R. W., Tencer, A. F., and Lawrence, K. L. "Resonance frequency evaluation of patients with closed tibiae fractures". In Biomedical Engineering III, Recent Developments, edited by L. Sheppard, Pergamon Press, New York, pp. 63-66, 1984.

Strauss, M. G., Bucholz, R. W., Tencer, A. F., and Lawrence, K. L. "Clinical fracture healing assessment by mechanical resonance." The 37th Conference on Engineering in Medicine and Biology, Los Angeles, Proceedings, p. 375, 1984.

Strauss, M. G., Bucholz, R. W., Tencer, A. F., and Lawrence, K. L. "Quantification of fracture healing via spectral frequency transfer functions - *in vivo* and *in vitro* assessment." 30<sup>th</sup> Annual Orthopedic Research Society, Atlanta, Proceedings, 1984.

Jones, R. E., Tencer, A. F., Bucholz, R. W., Lawrence, K. L., Johnson, K. D., Mooney, V., Carmichael, T. W., Potvin, A. R., and Strauss, M. G. "Fracture fixation and healing." Rehabilitation R & D Progress Reports, pp. 22-23, 1983.



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Strauss, M. G., Bucholz, R. W., Tencer, A. F., and Lawrence, K. L. "Identification of variables in the measurement of the resonant frequencies of human tibiae *in vivo*." Biomedical Engineering II, Recent Developments, edited by C. W. Hall, Pergamon Press, New York, pp. 120-123, 1983.

Strauss, M.G. and O'Reagan, J. "An X-ray translucent cervical orthosis." Biomedical Engineering I, Recent Developments, edited by S. Saha, Pergamon Press, New York, pp. 93-96, 1982.

Strauss, M.G. and O'Reagan, J. "An X-ray translucent cervical orthosis." J. Biomat. Med. Devices, and Art. Organs, Vol. 9, pp. 268-270, 1981 (Abstract).

**BOOK CHAPTERS**

Strauss, M. G. University of Illinois at Urbana-Champaign Engineering Student Projects for the Disabled. National Science Foundation 1989 Engineering Senior Design Projects to Aid the Disabled. John D. Enderle (Ed.) North Dakota State University Press, 1989-1994.

Strauss, M. G. and Gunderson, J. Applications in Rehabilitation Engineering. In J. Bronzino (Ed.), The Biomedical Engineering Handbook. CRC Press, 1995, pp. 2294-2305.

**MONOGRAPHS**

Strauss, M. G. and Gunderson, J. Illinois Bureau of Rehabilitation Services self perceived evaluation of assistive technology. Champaign: University of Illinois at Urbana - Champaign, Division of Rehabilitation Education Services, 1994.

Strauss, M. G. and Gunderson, J. Illinois Bureau of Blind Services self perceived evaluation of assistive technology. Champaign: University of Illinois at Urbana - Champaign, Division of Rehabilitation Education Services, 1994.

Strauss, M. G. An investigation into the use of impact resonant frequency measurements to non-invasively quantify fracture healing. (Biomedical Engineering Doctoral Dissertation, University of Texas at Arlington and The University of Texas Health Sciences Center at Dallas). University Microfilms No. ADG89-14119, 1988.

Strauss, M. G. An X-ray translucent cervical orthosis. Unpublished master's thesis, University of Virginia, Charlottesville, 1981.

**PATENT APPLICATION**

X-ray translucent cervical orthosis, 1981

**PARTIAL LISTING OF RESEARCH GRANTS AND CONTRACTS**

Total external funding: \$2,353,092

Title:	Promoting and Retaining in Mathematics, Engineering and Science
Source:	National Science Foundation
Period:	May 1, 1994 - April 30, 1997
Funded:	\$1,649,782 (PI)

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Title:	Graduate Training of Rehabilitation Engineers
Source:	Rehabilitation Services Administration
Period:	September 1, 1992 - Aug 31, 1995
Funded:	\$382,209 (PI)
Title:	Efficiency of Wheelchair Propulsion
Source:	UIUC Bioengineering
Period:	September 1, 1989 - June 1, 1989
Funded:	\$4,280 (Co-PI)
Title:	Three Dimensional Kinetic Analysis of Wheelchair Propulsion
Source:	Veteran's Administration
Period:	October 1, 1989 - September 30, 1992
Requested:	\$340,812 (Co-PI)
Title:	Research Experiences for Undergraduates in Rehabilitation Engineering
Source:	National Science Foundation
Period:	June 30, 1989 - Nov. 30, 1991
Funded:	\$10,000 (PI)
Title:	Biomechanics of Shoulder Injuries in Wheelchair Propulsion
Source:	The Veterans Administration
Period:	June 1, 1988 - May 31, 1989
Funded:	\$43,250 (Co-PI)
Title:	Engineering Student Design Projects for the Disabled
Source:	National Science Foundation
Period:	June 1, 1988 - May 31, 1995
Funded:	\$109,060 (PI)
Title:	Non-invasive Quantification of Fracture Healing
Source:	Veterans Administration
Period:	October 1986 - March 1987
Funded:	\$34,867 (PI)
Title:	Non-invasive Quantification of Fracture Healing
Source:	Veterans Administration
Period:	October 1985 - October 1986
Funded:	\$37,900 (PI)

**INDUSTRIAL DESIGN CONTRACTS**

Transparent Container Corporation, Berkeley, IL, 2001  
Ergonomic evaluation and remediation of a packer workstation.

Blaw-Knok, Mattoon, IL, 2000  
Product supplier evaluation methodology.

Flex-N-Gate, Urbana, IL, 2000  
Design of an impact test system for pickup truck bumpers.

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The Heil Company, Chattanooga, TN, 1999  
Redesign of refuse transport.

Cummins Engine Company, Inc., Columbus, Indiana, 1999  
Redesign of the engine coolant and oil thermostats.

Wilson Trailer, Sioux City, Iowa, 1998  
Design of a computer based model of the dynamic characteristics of a semi-trailer.

Squire-Cogswell Company, Gurnee, Illinois, 1998  
Instrumentation of a large scale vacuum pump to determine the heat transfer and flow characteristics of the lubricant.

Fellowes, Inc., Chicago, Illinois, 1997  
Development of instrumentation to measure the dynamic torque in a paper shredder.

International Skating Union, 1997  
An investigation of rink wall padding for ice skating.  
Biomechanical evaluation of padding to reduce impact force, acceleration and injuries with the rink wall during ice skating competitions. Research adopted as Standard #1019 by the International Skating Union.

Werner Company, Franklin Park, Illinois, 1995  
Modification of Compressed air rivet guns.  
Reduction in injuries and improved comfort were obtained through the retrofitting of a pneumatic, hand operated riveter.

Cummins Engine Company, Inc., Columbus, Indiana, 1994  
Detection of engine oil degradation in a diesel engine.  
Optical and electronics used to evaluate engine oil degradation.

Frigid Coil, Santa Fe Springs, California, 1991  
Aluminum and steel evaporator performance.  
Heat transfer evaluation of heat exchangers using a wind tunnel, mass and thermal instrumentation.

Cooper Power Systems, Macomb, Illinois, 1990  
Design of a high voltage insulator test station for high volume production.  
Modernization of arcing test stations to current standards, practice and safety.

Aurora Pump Company, North Aurora, Illinois, 1990  
Redesign of turbine pump testing station.  
Automation, verification and ergonomic assembly of hydraulic pumps.

AT&T, Rolling Meadows, Illinois, 1989  
Power cable stripping tool.  
Ergonomic redesign of a manual, hand-held tool to delaminate insulation from conductor.

Brunswick Bowling and Billiards, Muskegon, Michigan, 1988  
Calibration standard for the Brunswick lane monitoring system.  
Development of optical/mechanical instrumentation to measure the thickness of an oil film.